Dr. Macaulay
With the respects of the
Author.

MEDICAL JURISPRUDENCE.

An Essay

ON

MEDICAL JURISPRUDENCE.

BY JAMES WEBSTER, JR.

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TO THE EXAMINATION

OF THE

REV. FREDERICK BEAZELY, D.D. PROVOST,

THE

TRUSTEES, AND MEDICAL PROFESSORS

OF THE

UNIVERSITY OF PENNSYLVANIA.

On the 8th day of April,

1824.

Rec'd 81-17-2

TO

JOHN VAUGHAN, ESQ.

With sentiments of esteem and gratitude, this essay is inscribed by the

AUTHOR.

MEDICAL JURISPRUDENCE.

In glancing over the various subjects which present themselves, none appear better calculated for an inaugural dissertation than the subject of Medical Jurisprudence. Until within the last few years, this important branch of medical science seemed to be almost entirely neglected in this country. But of late it has assumed a more imposing aspect, and is now held as an indispensable part of medical education in several of our colleges.

We shall confine ourselves to the consideration of some of the more important subjects which come under the observation of medical men in a legal point of view, and more particularly of those relating to the destruction of human life.

CHAPTER I.

§ 1. PHENOMENA OF PREGNANCY.

It is asserted by some authors that women experience a particular sensation immediately after conception; the first, and certainly one of the most important signs, is a cessation of the catamenia, but it by no means follows when this is the case, that a woman is certainly pregnant; there may be suppression, which in many instances, will induce the usual symptoms attendant on pregnancy, as depraved appetite, a dyspeptic state of the stomach, morning and evening sickness, cardialgia, languor, &c.; on the contrary, it is said by some, that a woman may continue to menstruate and still be pregnant;* this, however, is denied by others, and the discharge is asserted to be only a secretion from the vagina and neighbouring parts. Together with the symptoms enumerated, the breasts about the third month become enlarged and painful, a brown areola encircles the nip-

* Vide note in Francis' edition of Denman's Midwifery, p. 231.

ples, and on pressure a serous fluid issues from them. In some instances, a salivation occurs, there are pains about the face and teeth, accompanied with a febrile disposition. In others, no such changes occur, and the woman is not aware of her situation, until after quickening takes place; hence, it appears that in the early months, our means of judging are far from being sufficient to entitle us to draw a decided conclusion in cases of importance, or in a court of justice.

About the end of the fourth month, the uterus ascends from the cavity of the pelvis into the abdomen, and the movements of the child being then first perceived, it is said to quicken; but in some instances the ascent is so gradual, that the sensation of quickening is not to be perceived. If, however, after this period, the woman suddenly recovers her usual health, the symptoms alluded to no longer exist, and the suppression of the catamenia continues, we can scarcely have a better proof of the existence of pregnancy. The abdomen now becomes enlarged, the skin is tense, and by relaxing the abdominal muscles, the womb which is now in the cavity of the abdomen may be plainly felt between the symphisis pubis and the umbilicus.

Various causes may conspire to produce abdominal enlargements, and consequently many mistakes have been made. Ascites has been mistaken for pregnancy, and pregnant women have been killed by the introduction of the trocar; they may exist together, and women in this state have borne children; they are to be distinguished by fluctuation, except the water be encysted. Diseases of the ovaria, but more particularly dropsy, may also be confounded with it. Tumours sometimes form in the uterus, giving rise to a greater than ordinary enlargement of the abdomen, as hydatids, scirrhus, moles, retention of the menses, &c.; in these cases it has been supposed that the motion of the child could be perceived; this is very probably caused by wind in the intestines, or the pulsation of the large blood-vessels.

Within the last few years it has been proposed that *auscultation* might be applied to ascertain the state of pregnancy. Thinking with propriety that the tube or stethoscope of M. Laennec would be applicable to this purpose, M. Kergaradec embraced the earliest opportunity of testing it, and having made a number of observations on the subject, published them in a small memoir.* He was led to the conclusions that by this means, it will be possible "to acquire some information as to the

* Memoire sur l'auscultation appliquée à l'etude de la Grossesse, ou Recherches sur deux nouveaux signes propres a faire reconnaitre plusieurs circonstances de l'etat de gestation. Par. M. J. A. Lejumeau de Kergaradec, D. M. P. &c. Paris, 1822.

existence or absence of the state of pregnancy, and particularly as to the vitality of the child."

Fodéré mentions* that M. Maoir, of Geneva, had discovered that it was "possible to recognise the vitality of a child when nearly at the full period of gestation, by the application of the ear to the mother's abdomen."

For judiciary purposes, however, we must resort to an examination—and here that delicacy is not required, which is so strictly to be observed when merely private opinion is concerned. At about the end of the sixth month, we may generally be able to determine with the greatest degree of certainty. Having previously evacuated the contents of the bladder and rectum, let the subject be so placed that the abdominal muscles may be relaxed; when a tumour will be distinctly felt between the pubes and umbilicus, inclining to one side or the other, or hanging over the pubes, turning proportionally the os uteri to the opposite side, or back towards the sacrum, carrying it at the same time higher up and further from the reach of the finger.† The motion of the child will now be very perceptible, on dipping the hand in cold water, and applying it to the region of of the uterus.‡ At the end of the seventh month, the tumour extends as high as the naval; and by the end of the eighth month it rises to about mid-way between the umbilicus and scrobiculus cordis, the os tincæ is smooth and high up in the pelvis; before the termination of the ninth month, the fundus uteri is as high up as the scrobiculus cordis, and the os tincæ begins to relax.

§ 2. TERMINATION OF PREGNANCY.

The proper period for the expulsion of the fœtus having arrived, the uterus takes on a new action, and ceasing to enlarge, it begins powerfully to contract, until its contents are finally expelled.

Taking it for granted then, that the fœtus is expelled, it may become our province to decide whether or not the delivery has actually taken place; for this purpose, if an examination be made immediately, we can generally decide with a tolerable degree of certainty. As might be expected, the abdomen is prominent, and its parietes are lax and hang in loose folds; white lines called *lineæ albicantes*, caused by lacerations in the epider-

* Dictionaire des Sciences Medicales, tom. 57.
† Bard's Midwifery, p. 98. ‡ Smith's Forensic Medicine, p. 485.

mis, mark its surface. These lines, however, may be produced by other enlargements, as ascites, obesity, &c. therefore they cannot be considered of the least importance. The uterus may be felt like a ball through the integuments; the external organs are considerably enlarged; the vagina is distended and flabby; the lochial discharge which proceeds from it, may be distinguished by its pale colour and peculiarly fetid odour, which cannot be mistaken. The os uteri is dilated, soft, and nearly circular, and the parts are extremely tender. The mammæ are enlarged and secrete milk, the areola around the nipples is of a deep brown colour. The eyes are sunken and are surrounded by a dark-coloured ring, the skin is of a peculiar whiteness, resembling that of a person convalescing from disease;* and not unfrequently in cases of solitary delivery, may we expect to find lacerations of the perineum, as the proper precautions against this accident cannot be taken under such circumstances. It will also be remembered that women, immediately after delivery, generally suffer considerably from debility and langour; exceptions, however, to this are not at all unfrequent, and in these cases we depend entirely upon the local appearances.

It was formerly supposed that we could ascertain at any period by an examination after death, if pregnancy had ever taken place, and how often.

The vesicles of the ovaria having received the stimulus of the male, discharge the ovum, which is caught by the fimbriæ of the fallopian tube, thence it is carried into the uterus and finally develops a perfect fœtus. The coats of the vesicles become thickened, the cavity from which the ovum was expelled is entirely obliterated, and a peculiarly rugous appearance is presented to us, having a yellow tinge, which is called *corpus luteum.* An opinion has prevailed that corpora lutea were only to be found in the impregnated female, but at the present day it is generally admitted, that it may be produced by strong desires alone, and instances are not wanting, to prove that such is the fact.†

It is said that the corpora lutea of virgins may be distinguished by their small size, and in a preparation, in the possession of Dr. Blundell, taken from a girl aged seventeen years, who died of chorea, where the hymen is unbroken and the entrance of the vagina nearly closed, there are no less than four corpora lutea, which in every respect are so natural that "I occasion-

* Beck's Medical Jurisprudence, p. 137.

† Vide Sir E. Homes paper in the 1st No. Philosophical Transactions for 1819; also Dr. Blundell's on Generation, Medico-Chirurgical Transactions of London, vol. x. p. 245.

ally, (says Dr. Blundell) circulate them in the class-room, as accurate specimens of the luteum upon the small scale." From these facts it is very evident that none but an experienced eye can distinguish them, and still, great uncertainty must exist in the mind of the practitioner.

§ 3. MISCELLANEOUS OBSERVATIONS.

We have now gone over in a cursory manner, the subject of pregnancy. There still, however, remain some important considerations connected with it, of which I propose to treat in this section; and first, of the length of time that a woman may carry a child.

Nine calendar months or forty weeks, calculating from two weeks after the last appearance of the menses, are usually required for the completion of the process of gestation; but a child may be born perfectly formed, one or two weeks earlier, or, may be prematurely delivered. On the contrary, delivery may be retarded longer than this period, and physicians now generally agree that it may be protracted even for a longer time than the tenth month.*

The laws of most countries consider children legitimate, though born more than nine months from the death of the husband. In this country, as in England, no definite time is prescribed by law;† it considers all children as legitimate, who are born within forty weeks after the death of the husband. The laws of Scotland allow that a child is legitimate, if born six months after marriage, or ten months from the death of the husband; and before the revolution, those of France considered it so if born in ten months after connexion, but we find that "the legitimacy of a child born three hundred days after the dissolution of the marriage contract, may be contested."‡ The Roman law allowed ten months, and the Emperor Adrian decreed for eleven, "where the mother was of good and chaste manners."

Women not unfrequently feign themselves to be pregnant when in fact they are not so. In such cases, an absence of the signs mentioned in the first section would alone be sufficient to

* Professor James informed me that a case had fallen under his observation, where delivery had been retarded until near the end of the tenth month.

† For a more detailed account of the laws of England, on the subject of *inheritance*, see Judge Cooper's notes in Male's Forensic Medicine, p. 215.

‡ Code Napoleon, Titre VII. Chap. I. Art 315, Paris, 1813.

confute them, but others suggest themselves. Before the period of puberty, nor at a later period, when the menstrual discharge has ceased, a woman rarely becomes pregnant. The former varies considerably in different individuals and climates; in warm climates, it takes place at between eight and nine years of age, and in northern, or cold climates, the period does not arrive until the woman has attained to the age of eighteen or twenty years. In our own country at the age of thirteen or fourteen years, is the period when it generally takes place. The *change of life*, or period when the menstrual discharge ceases, occurs from the forty-fourth to the fifty-fifth year; in this climate at about the forty-fifth. Cases however are mentioned by Smith and Capuron, where pregnancy has taken place before the appearance and after the cessation of the menses.

There may be present some one of the diseases of the uterus, any of which will prevent impregnation, as scirrhus, procidentia, tumours, &c. a closure of the os uteri; imperfect hymen; inveterate fluor albus; an inordinate flow of the menses, or a union of the sides of the vagina, so as to preclude the possibility of connection.

CHAPTER. II.

§ 1. PHENOMENA OF DEATH.

PREVIOUSLY to entering upon the more immediate object of this essay, as the subject is an important one, and so intimately connected with our succeeding remarks, we shall enumerate in a succinct manner the signs of death.* In forming an opinion, we must first take into consideration the circumstances of the case, and in some instances these will be sufficient to determine the question; on the other hand, they may be the very means which will throw obscurity and incertitude upon the subject, and cause us to hesitate before we decide.

On first beholding a dead body, we are generally struck with the peculiar expression of countenance or cadaverous appearance which is presented to our view, denominated the *facies Hippocratica;* this peculiar appearance has also been observed

* For an interesting paper on this subject, by Dr. Ducachet of New York. see Am. Med. Recorder, vol. 5. p. 39.

during life, when dissolution is approaching, therefore of itself, it cannot be of much importance, but in connection with other signs it is most undoubtedly deserving of attention. The most certain signs, when found to exist together, are an absence of respiration, evinced by holding a looking-glass before the mouth, setting a cup of water on the sternum and observing whether the water moves or not; stoppage of the circulation; rigidity of the limbs; flaccidity of the cornea;* a film formed over the eyes; loss of motion in the eye-lids; flatness of the buttocks;† relaxation of the sphincters; coldness and insensibility of the body.

Various means have been proposed to be employed in cases of a doubtful nature, to ascertain if death had actually taken place. Among others, cupping has been recommended; and if blood flows from the capillaries, it is extremely probable that life is not extinct; powerful stimuli are to be blown into the nostrils, in order, if possible, to excite sneezing; the introduction of a sharp pointed instrument under the finger nails, will often rouse persons from the most alarming syncope, and has therefore, been recommended in cases of apparent death;‡ incisions with the knife; scalding with boiling water or oil; loud noises; cauterizations, &c. may all be of service. Nothing need be said of galvanism nor electricity, as their effects on dead animals are well known, and as they exhaust the irritability of the heart and blood-vessels they are dangerous in debilitated subjects. The last and certainly the most conclusive evidence of death, is putrefaction. "But it is a nicer point to determine the presence of putrefaction than is commonly supposed," and the opinion of a physician may be called for, when from the smell it is supposed to have commenced, which may be owing to a decomposition of the alimentary matters, or, from the appearance of purple spots on the surface, which are not unfrequently the consequence of disease; hence it appears that unless putrefaction has already affected the solid parts, "it is safer to judge from the concurrence of signs enumerated above, than to trust to the appearance of putrefaction alone."

Besides other symptoms of putrefaction occurring in certain diseases during life, blood drawn from the arm has produced fainting in the operator from its horrible smell; the urine too, may be the source of a putrefactive odour, and in typhus fever, from which persons have been recovered after asphyxia has taken place, the odour of putrefaction has been present.

* Hunter on the Animal Economy.
† Elliotson's translation of Blumenbach, as quoted by Dr. Ducachet.
‡ Ducachet on the signs of death, Am. Med. Recorder.

§ 2. FETICIDE.

By this term we understand the destruction of the embryo, by producing abortion during the early months of pregnancy. Women are very subject to miscarriage, and in many instances the greatest care and attention are required, in order to prevent an occurrence, which not unfrequently jeopardizes the life of the mother, and renders her exceedingly liable to it in succeeding pregnancies.

It is, however, to the subject of *criminal abortion* that our remarks will chiefly refer. The circumstances which have urged females to the commission of such a crime, are various, but in by far the greatest majority of cases, it has been for the purpose of avoiding the disgraceful consequences of illicit intercourse, and consequently, it is generally in these cases, that the physician is called upon to give his testimony. His first object must be to ascertain if the woman has had an abortion, and, except it be in the early months, (when it will be difficult and perhaps impossible to ascertain) nearly the same appearances will be presented as at the termination of pregnancy : of course, they will not be so distinct as those caused by the delivery of a mature child. Should several days have elapsed, the probability is that the parts will be so restored to their natural appearance, that our examination will lead us to no satisfactory conclusion.

It may be, as is not unfrequently the case where violent measures have been resorted to, that the death of the woman is the consequence, and as there may be persons charged with having aided in procuring it by improper means, an examination after death must decide. If the pregnancy be several months advanced, and our examination be made immediately after the death of the woman, in connexion with the other circumstances of the case, the appearances presented on dissection might be important. The uterus is enlarged and thickened, its capacity greatly increased, its blood-vessels are enlarged ; the part from whence the placenta was detached is rough ; the cervix uteri is relaxed ; the vagina is dilated ; the ligamenta rotunda are relaxed ; the ligamenta lata are nearly effaced,* and if the examination is made immediately after death "it is probable that the venous sinuses may still remain considerably enlarged."† Some of these appearances may be produced by various other causes ;

* Dr. J. B. Beck's Dissertation on Infanticide, p. 37 ; and Male's Forensic Medicine, p. 162.

† Hutchinson on Feticide, London Medical and Physical Journal, No. 251, p. 13.

moles, as they sometimes induce some of the usual symptoms of pregnancy, when thrown off, may also give the appearance of a miscarriage;* the relaxation may be the consequence of flooding.† Of the corpora lutea, nothing need be said; that they may exist where impregnation has never taken place, we think there can be no doubt.

The destruction of the fœtus may be accomplished, 1st, by direct means, as the introduction of instruments into the uterus, blows and pressure on the stomach; 2d, by indirect, or such means as act through the medium of the mother, as medicines taken internally, evacuations, &c. The former of these modes is now very seldom employed, but the latter most generally. This includes the drastic purgatives, electricity, salivation, violent emetics, and frequent bleedings, especially, in the foot; cases are recorded where after having been bled by a practitioner, the woman on his departure has removed the dressings in order to encourage hæmorrhage for this purpose.‡ Emmenagogues, amongst which, those most commonly employed for this purpose are the juniperus sabinæ, the cucumis colocynthis and the helleborus niger. The *ergot*, which has lately been introduced into obstetric practice, seems to exert a specific action on the uterus, and is said by some, to be frequently fatal to the child,§ this, however, is denied by others. It will, however, be very rare, that any of these means will produce the required effect, perhaps never, unless used to an extent dangerous to the mother, except, indeed, there exists a constitutional predisposition to abortion.‖

The causes of abortion may be perfectly natural, and the discriminating practitioner will always bear them in mind in cases of importance. Besides an existing predisposition to it in the female, it is produced by great mental emotion; violent exercise; blows on the abdomen; accidental falls; frequent vomiting; drastic purgatives; diseases of the uterus; excessive venery; previous abortion; death of the fœtus; too great indulgence in the use of spiritous liquors; fluor albus; attachment of the placenta over the os uteri; hæmorrhage, "from whatever source or at any period;"¶ and, what is but too common in fashionable life, external pressure on the abdomen. These, with many

* Smith's Forensic Medicine, p. 298. † Male, p. 162.

‡ Smith's Forensic Medicine, p. 306.

§ Dr. Hosack's paper in the New York Medical and Physical Journal, vol. 1. p. 206; and Dr. Atlee on Ergot, American Medical Recorder, vol. iv. p. 144.

‖ Beck's Dissertation, p. 42.

¶ Burns on Abortion; and Beck on Infanticide, p. 42.

more, may induce abortion without the least degree of criminality being attached to the female.

In order to avoid any uncertainty that might exist respecting the mass discharged, a short account of the progressive development of the *fœtus in utero*, may not be unnecessary, but perhaps useful. We shall say nothing of it at a very early period, as microscopic observations are not considered valid in forensic inquiries,* but commence at the period when we conceive an abortion can be first proved. At about the forty-fifth day, the form and parts from whence the extremities are to arise, may be discerned, its length is then about ten lines;† at sixty days, it is more perfect, and two inches in length; at three months, it is still more so, and in fourteen or fifteen weeks, according to the observations of Chaussier, all the external parts, except the hair and nails, are completely formed. It thus progressively becomes perfected, and after the end of the fourth month, when quickening takes place, there can be no difficulty in distinguishing it. From the fifth to the seventh month, the fœtus may be born living, but generally cannot maintain existence, hence, it is immature; after the seventh month it is completely formed in every respect except in size and weight; is capable of being reared, and cannot therefore be considered under the head of abortion, but as premature. Instances are related in which children born between the fourth and fifth months, have been raised.

In some of the earliest nations of antiquity, *abortion* was not only tolerated as a private act, but indirectly favoured by the laws.‡ According to those of Lycurgus, it was permitted with a view to preserve the number of citizens, equal to the number of lots of ground. During the reign of the Cæsars, and until the time of Constantine, this practice prevailed to a considerable extent in ancient Rome. In modern times, we find in some parts of the world, that this crime is not yet *abolished;* but it is to be hoped, that in proportion as christianity, which has already planted the standard of peace in some of the most savage nations of the world, spreads its enlightening and benign influence over mankind, will crimes so atrocious in their nature, so baneful in their effects, and so revolting to humanity, cease to be recorded on the page of history.

According to the laws of most civilized nations, the degree of punishment varies according to the time at which abortion is procured; it being considered a crime of greater enormity, if committed after, than before quickening; respecting the pro-

* Hutchinson, Essay on Infanticide, p. 4. † Ibid.
‡ London Medical and Physical Journal, p. 91.

priety of such a distinction, we need not remark that it is founded in error, and likely to have a very mischievous tendency. That the embryo, from the very earliest period, is endued with life, requires no arguments to prove; such is the opinion entertained by the most enlightened medical philosophers of the present day.

Before the reign of Henry the second, the punishment inflicted in France, on persons convicted of having procured abortion, was death. In 1791, the new penal code, punished it with twenty years imprisonment in irons; the code for 1810, punishes it with imprisonment. The laws of Germany and Bavaria punish it with from two to six years, if procured during the first thirty weeks, and from eight to ten, if during the last month.* By the laws of England, if any person or persons wilfully use means intending the destruction of the fœtus and consequently abortion, the woman not being, or not proved to be quick with child, the same shall be declared guilty of felony, and liable to transportation for a term not exceeding fourteen years;—but should such means be employed after the period of quickening, the person so offending, the aiders and abettors shall be declared guilty of felony and punished with death accordingly.†

In the laws of this state I find no distinction made with respect to punishment, as to the period at which abortion may be procured. "If any person or persons shall counsel, advise or direct a woman to kill the child she goes with, and after she is delivered of such child, she kills it, every such person so advising or directing, shall be deemed accessary to such murder, and shall have the same punishment as the principal shall have."‡

§ 3. INFANTICIDE.

As it was stated in the last section, that a child of seven months may be raised, so the destruction of it after that period, is considered to be a crime of the same enormity as if it was born at the full time. As it is now perfect, except in size and weight, these may enable us to form a tolerably correct opinion respecting its age. The weight of a child at seven months should be at least five pounds, avoirdupois, and not less than fifteen inches in length.§ ‖ There are also some other peculiari-

* Hutchinson on Feticide, p. 96. † Chitty's Criminal Law.

‡ Laws of Pennsylvania, Vol. 1. Chap. 236, p. 113.

§ Smith's Forensic Medicine, p. 312.

‖ The following account of the gradual progress in the length of the fœtus from the fifth, until the ninth month, taken from the Dictionaire des Sciences Medicales, will aid us in forming an opinion on the subject. It will be

ties;—as the head is unproportionably large, the bones are soft and yielding; the fontanelles are very wide and open: the eyes are closed; the superficial vessels are turgid with blood, giving an appearance of great vascularity to its whole surface, but more particularly, and for a greater length of time, to the palms of the hands and soles of the feet; the membrana pupillaris does not entirely disappear, and the iris is not yet perfectly formed. In the female the clitoris is very large, and the external parts are protuberant; in the male, at the end of the seventh month, the testes are not found in the scrotum.

On dissection we find the liver disproportionably large and filling a considerable part of the abdominal cavity; the fluid in the gall-bladder, if any be there, is watery and transparent, the heart is also very large, and the lungs are in a state of collapse, very small and hard.*

According to the scale of admeasurement given by Professor Chaussier, the middle of the body of a mature child, corresponds exactly with the umbilicus; it is two or three centimeters higher at the eighth month; still higher at the seventh month, and at the sixth month, it is exactly at the abdominal extremity of the sternum.

The object of a professional man, when called upon to give his evidence in a case of alleged infanticide, will be, after having fixed an actual delivery on the mother, to establish the fact relative to the child, of its having been born alive, and if it was, what were the causes of its death. The death of a child may take place several weeks before birth, and still the child may be carried to the usual period; under these circumstances, it is exposed to the action of the liquor amnii, which will cause the cuticle to separate, and render the body flaccid; there are also bloody effusions in the large cavities;† we can in these cases

observed that there is some disparity between this statement and that of Dr. Smith.

" Les recherches suivies du Professor Chaussier, preuvent qu'une enfant bien conformé, et naissant au terme de neuf mois de grossesse, pèse le plus ordinairement, trois mille grames, c'est-a-dire, cent onces ou six livres un quart; et que le terme moyen le plus ordinaire de la grandeur du fœtus, depuis la fin du cinquiéme mois jusqu' à la fin du neuvième, est

A 5 mois	255 millimetres ou	9 pouces	de longeur.
6	325	12	
7	380	14	
8	440	16	
9	488	18	

Dictionaire des Sciences Medicales, Art. Avortment, tom. 2. p. 487.

* Smith's Forensic Medicine, p. 312. † Ibid, p. 315.

generally determine with accuracy; but when the child is recently dead, it is sometimes a nice and very difficult matter to decide.

In a child born dead, or when respiration has not taken place, the lungs will be found to be of a dark brown colour; solid and contracted, occupying but a very small space within the cavity of the thorax. Upon taking them out of the body and putting them in water, they sink, and when cut into with a knife, the same sensation is conveyed to the finger, as if cutting through a solid piece of flesh; no air is emitted; no blood flows, nor is there any crepitation; the ductus arteriosus and ductus venosus are open and contain blood; the diaphragm is convex upwards and greatly arched. On the contrary, when the child is born alive the appearances presented are exactly the reverse of those enumerated. The moment respiration commences, the colour of the lungs is changed to a bright florid red; they become light and spongy, and in proportion to the length of time that respiration has continued so are they expanded, and when completely inflated, they entirely fill the the cavity and cover the pericardium. When put into water* they are so light as to swim on its surface; on being cut into, a peculiar sensation is perceived, the air rushing from the cells causes a very peculiar crepitating sound, and a small quantity of a bloody fluid will follow the incisions; the ductus asteriosus and venosus will be found to contain no blood, and the diaphragm, on account of the pressure of the inflated flungs, will not be so convex and arched.

It has been contended by some very eminent physiologists, that the evidence drawn from the state of the lungs was uncertain, and not to be depended on. It will be impossible, in the short space allotted to the subject in this essay, to enter into a full discussion on this important and interesting subject; my observations must therefore be very general. The objections which have been urged against the *hydrostatic test*, in cases of infanticide, may be summed up in a few lines. As much credit may be attached to these objections as the reader may conceive they merit.

1. It has been asserted that a child may breathe whilst yet in the uterus, and still, not be born alive; if such has been the case the lungs will be dilated and buoyant.
2. One lung has been observed to sink in water, whilst the other floated.

* It must be borne in mind that the temperature of the water should be the same as the surrounding atmosphere. It should also be perfectly free from salt, for when this is contained in it, its specific gravity becomes increased.

3. The lungs of children born alive, and who had respired, it has been said, have sometimes sunk in water.
4. After the putrefactive process has continued, sufficient air will be evolved to cause the lungs to float.
5. The lungs of still-born children may be partially inflated by artificial means, as blowing air into the mouth and nostrils.
6. The child may be born alive, and respiration not commence for some time; in this state the child may exist.

With regard to the first objection, granting that a child may breathe whilst in the uterus "when its mouth presents at the dilated orifice of that organ, and the vagina admits a free passage for air to it," it is perhaps the only case in which a child can possibly breathe whilst contained in that viscus. A presentation of the face, as it is very rare,* is also very difficult to manage, and hence professional aid is generally required, so that under these circumstances a charge cannot be brought, as it must be evident the crime could not be committed secretly.†

The child may breathe, after the head has passed the os uteri and whilst it is in the vagina or resting on the perineum; Dr. Smith mentions an instance, which came under his own observation, where he had every reason to believe that such was the case. That a child should die before birth under either of these circumstances, seems strange, for the fact of its having breathed so prematurely, would seem to indicate, that it was possessed of unusual strength and vigour; and if pressure on the cord be alleged as the cause of death, it would be inconsistent, for "it is wholly immaterial whether the circulation in it be stopped or not after respiration has commenced, as the fœtal circulation has then become unnecessary."‡

To the second objection we reply, that from the researches of M. Portal, we know that air enters the right lung first, the right bronchial tube being the shortest, hence if it should be the right lobe which floats, any difficulty is readily cleared up, by a knowledge of this important fact; we know also that "respiration is not completely performed on the first effort, but that it is a process gradually advancing to perfection; and that it will be more or less protracted according to the degree of vigour of which the infant is possessed."§

The third objection seems to have been urged more from

* See the report of L'Hospice de la Maternite at Paris from 1797 to 1806, in James' Burns.

† Smith's Forensic Medicine, p. 324.

‡ Beck on Infanticide, p. 53.

§ Ibid. p. 333; and Hutchinson on Infanticide.

analogy than from actual observation and facts; it is well known that several of the diseases of the pulmonary organs of adults, will cause them to sink in water, but in the case of infants, such an occurrence must necessarily be very rare. A single case of aborted fœtus which had scirrhous lungs is mentioned by Brendelius and referred to by Dr. Beck. There can be no difficulty in deciding whether the lungs are sound or diseased; and if diseased, and respiration has ever taken place, as some air must have entered them, it can be very readily decided. On cutting them into several pieces and putting them in water, some will certainly float, and then there can be no doubt respecting the conclusion to which we are entitled. On the contrary, when none float we may infer that the child never respired; "where difficulties are thrown in the way, however, which we cannot get over satisfactorily, our duty will be to decline any positive deduction, and leave justice to satisfy herself in some other manner."

As respects the fourth objection, accurate observations have proved that the lungs, which are the last parts of the body to become putrid, although they have not respired, will often float on the surface of water, after putrefaction has commenced, and so long as their organization is not completely destroyed by it, but when this is the case they will sink. It is evident that some difficulty will exist in these cases; nevertheless rules have been laid down by the generality of writers on legal medicine for distinguishing between the air of respiration and that which is emphysematous. As the air consequent on putrefaction is situated under the external membrane of the lungs in bubbles, by squeezing them hard, these bubbles will burst and the lungs of consequence will sink in water.* The air bubbles of respiration are so small as hardly to be perceived by the naked eye, whilst those of emphysema are large and run in lines between the component lobuli of the lungs.† Lungs which have respired although putrid, always have a crepitus on being cut into, whilst those which have not respired, although they float, do not possess this peculiarity.‡

Respecting the fifth objection there can be no doubt that the lungs may be artificially inflated; it may be the last act of maternal kindness endeavouring to preserve a life, which if spared must inevitably bring shame and disgrace upon her, and which in the fulness of her heart, she had rather suffer than see her in-

* Smith's Principles of Forensic Medicine, p. 329.

† William Hunter on the Uncertainty of the signs of Murder, &c. Med. Observations and Inquiries, vol. 6. p. 284.

‡ Marc's Manual, and Beck's Dissertation, p. 59.

fant perish without an attempt to save it. She may have been the deluded victim of some vile seducer; under these circumstances, when she discovers that the child is really dead, what good end could it answer to make it known? What moral principle requires her to divulge her secret? She resolves to conceal her shame, and perhaps for the future to lead a virtuous life; it may be discovered, and the means she used only to hide her shame, will be considered as proof of her guilt.

Aware then that the lungs may be thus artificially inflated, various tests have been proposed by writers on this subject, amongst which those of Buttner, and Ploucquet are deserving of most attention. The former knowing that the blood does not pass through the lungs until after respiration had commenced, concluded that in a child born dead "the arteries and veins of the lungs are found destitute of blood, and in a collapsed state, notwithstanding any artificial inflation that may have been practised upon them. On the contrary, the vascular distention of the pulmonary organs proves that the child has breathed, for nothing but natural respiration can produce this effect."* The absolute weight of the lungs is not increased by the introduction of air after death, whereas, when respiration has taken place such is not the case, and hence the test of Ploucquet is highly important. It is said the air introduced artificially may be squeezed out of the lungs, upon which they sink in water. Observe if there is any crepitation, or blood when the lungs are cut into. The external conformation cannot assist us in our inquiry.

It would seem that instances have occurred where the circulation has continued in infants who had never respired. Three cases are recorded by Bohn where infants had been deeply buried in the earth, and taken out alive after several hours; two cases are related by Wrisberg† where one infant lived seven, the other nine minutes, enclosed in their membranes, when he ruptured them.

Ploucquet founded his celebrated test upon the principle that as the fœtal lungs contained very little blood the vascularity and consequently the real weight of lungs which had respired must be considerably increased. From his numerous observations therefore, he was induced to lay it down as a general rule, that the relative weight of the lungs of a still-born child, to his whole body, is as one to seventy; and those of a child which has respired as two to seventy; thus by the introduction of blood into

* Beck's Inaugural Dissertation, p. 56.
† Hutchinson on Infanticide, p. 356.

the pulmonary organs after the respiratory process has commenced, we find that their absolute weight is doubled.

This test has also had its objections. The child may die of hæmorrhage, and it has been said that the loss of blood would alter the ratio. In such a case it is said that "the lungs would bear a greater proportionate weight."* It must be very evident that a congestion of the fœtal lungs cannot take place to any extent, the blood must necessarily pass through the natural apertures of the ductus arteriosus and venosus, hence this objection cannot hold good. Should there be any disease of the lungs, as dropsy, scirrhus, &c. they will readily be discovered, and as they serve to increase the weight, of course this test will not be applicable in such cases; these observations will also apply to putrefaction. Respecting the tests of Professor Daniel nothing need be said, as they are not considered, by writers on medical jurisprudence, to be entitled to much confidence.

It has been customary with the most approved writers on juridical medicine, to class the means by which the death of the child may have been caused, under the heads of omission and commission.—In the first class are included cases, where the cord has been divided without the proper precaution of tying it having been taken. Instances are on record, where it has been divided without this precaution, and no loss of blood has ensued, but it is the generally received opinion among medical practitioners, that great danger must result from such neglect.—2d. The child may have been left exposed to the influence of the cold, and thus perish: "the signs of a child having perished in this manner, are a determination of the blood from the superficies of the body towards the interior, leaving paleness of the skin and vacuity in the vessels of the surface."—3d. Neglecting to give the nourishment proper for its support. If death be thus occasioned, (which must be very rare) "the dissection of the body would ascertain the fact as to its having been fed or not, at least for some time before its death."—4th. The woman may be so situated during labour, that when the head is delivered, the face of the child rests upon the bed-clothes, and respiration being prevented, it may in this manner be suffocated; it may be drowned in the uterine discharge,† or

* Smith's Principles, p. 341.

† William Hunter on the Uncertainty of the Signs of Murder in the case of Bastard Children, Med. Observations and Inquiries, p. 289.

strangulated by the umbilical cord when of an unusual length.*

In the second class, or under the head of commission, we shall mention the manner in which a child is generally put to death after birth. It may be effected by the various means which will come under consideration in the section on homicide, but the peculiar means, and those which cannot be employed upon adults, are first, tying the umbilical cord too prematurely, whilst the fœtal circulation still exists, and before the child has respired, which is indicated by its crying; this, however, generally takes place so soon, "that we are not to suppose a ligature will be often fixed with such fatal promptitude, nor indeed in ordinary cases even accomplished where it might be intended."

Secondly. The death of a child may be effected by passing a long sharp needle or piece of wire into the brain through the fontanelles, or by thrusting it into other parts of the body; instances are related, however, where a needle has been thrust into the most important organs, as the heart, stomach, &c. without any ill effect; this, together with wounds, bruises, and almost any sort of violence, may soon be detected by a minute examination. Should the child have been suffocated, no matter by what means, the pulmonary congestion will be evident; and where it has been covered with sand or earth, particles may in all probability be found in the mouth and nostrils.

There is another circumstance which may come under the observation of the physician in a criminal court. The child having been found, it may be desirable to know the length of time that it lived. The cord is separated from the navel about the fifth day, but it is in general slightly detached on the fourth; at about the ninth day, the surface from whence it is detached, heals up. After a later period, if it should be important to know how long the child has been dead, our means of determining will depend on the extent of putrefaction.

In making up his mind in cases of such deep interest, the physician should avoid falling into the errors of popular prejudice; he should pursue his examination with the greatest care and attention, carefully noting every appearance; he must bear in mind that upon his testimony alone, may depend the life of a fellow creature. The circumstan-

* Burn's Midwifery, edited by Professor James, p. 183.

tial evidence, in as much as it is not necessarily connected with his testimony, must be kept entirely out of view; and finally his opinion, the result of deliberation and knowledge, must be advanced in as delicate and precise a manner as possible, at the same time that he carefully observes not to enter into any thing like argument or disquisition.

The punishment inflicted on those found guilty of infanticide, in almost every civilized nation, from the most remote period, has been very severe. Previous to the year 1803, the law of England punished with death any woman who was convicted of having concealed the birth of her bastard child, "except she could prove, by one witness at least, that the child whose death was by her so intended to be concealed, was born dead."* After this period, however, it was decreed "that women tried for the murder of bastard children, are to be tried by the same rules of evidence and presumption, as by law are allowed to take place in other trials for murder: if acquitted, and it shall appear, on evidence, that the prisoner was delivered of a child, which by law would, if born alive, be a bastard, and that she did, by secret burying, or otherwise, endeavour to conceal the birth thereof, thereupon it shall be lawful for such court, before which such prisoner shall have been tried, to adjudge, that such person shall be committed to the common gaol, or house of correction, for any time, not exceeding two years."†

In France, until the year 1791, "every woman convicted of having concealed her pregnancy, and put to death her bastard child, was condemned to death."‡ In the new code for 1810, we find the following articles, relating to the concealment and death of bastard children:

Art. 349. "Those who shall expose and abandon in a solitary place, a child under seven years of age, and those who may order it to be exposed, shall on that account alone, if such order be executed, be imprisoned for a term not less than six months, and not more than two years, and fined from sixteen to two hundred francs."

Art. 350. "If a child has been exposed or abandoned by his guardians or tutors, or in consequence of their orders, the punishment shall be imprisonment for a term not less than five years, and not exceeding ten, and a fine of from fifty to one hundred francs."

* East's Crown Law, p. 288; quoted by Dr. Beck.
† Blackstone's Commentaries, vol. iv. p. 198.
‡ Beck's Dissertation, p. 89.

Art. 351. "If in consequence of such exposition or abandonment as mentioned in art. 350, the child shall be mutilated or crippled, the act shall be considered and punished as in the case of wounds voluntarily inflicted, and if the consequence be death it shall be considered and punished as murder."*

Until the year 1790, concealment of the death of a child, was punished in this state, as a capital crime; at that time it was altered, not being considered sufficient evidence to convict the party without probable presumptive proof, that the child was born alive. The act of 1794 declares, however, that "the concealment of the death of the child shall not be considered conclusive evidence to convict the party indicted of the murder of her child, unless the circumstances attending it be such as shall satisfy the minds of the jury that she did wilfully and maliciously destroy and take away the life of such child." Concealment is punished with imprisonment at hard labour, providing that "if the grand jury shall in the same indictment, charge any woman with the murder of her bastard child, as well as with the offence of concealing its death, the jury, by whom such woman shall be tried, may either acquit or convict her of both offences, or find her guilty of one and acquit her of the other, as the case may be."†

§4. HOMICIDE.

By the term homicide we understand the destruction of a human being by violent means. In as much as it may be more or less criminal, according to circumstances, it will be necessary to mention the various kinds, to each of which a different degree of punishment is attached:

1st. *Culpable Homicide*, where the life of a person may be destroyed without the least intention, although it may have been put in jeopardy, as for instance, by firing a gun with the intention of missing, or from not being aware that it was loaded.

2d. *Manslaughter*, the killing of a person without any malicious intention; when death is thus occasioned, it is in fact little more than a mere accident.

* Translation of the code of Napoleon for 1810.
† Note to the laws of Pennsylvania, vol. 1. p. 114.

3d. *Felonious Homicide*, where one person is killed by another without such being his intention, but where he had designed to take away the life of an individual against whom he harboured some malignity; thus mistaking one of whom he entertained no unpleasant feelings, or of whom he perhaps had no knowledge, for the person that he had intended to destroy. In a case like this, he of course is considered equally guilty of murder as if it had been the person against whom he had conceived such a diabolical design, and he will be punished accordingly.

4th. *Murder*. This is a crime of the greatest enormity. It is the wilfully and intentionally killing of a human being. There is also another species of homicide, where if a person is attacked, he may be forced in self-defence to kill another; to this, however, no punishment can be attached, it is called *Justifiable Homicide*.

The means which are generally employed for the accomplishment of this crime are various; they come under consideration in this section, and will be treated of in the follow- order, viz. wounds and bruises, suffocation and poisons.

Wounds and Bruises.

It is not to be supposed that we shall enter into a minute detail of the subjects now under consideration. In as much as they are the means by which violent death is commonly effected, they will consequently come frequently under the consideration of the surgeon. Supposing then a dead body to be found with wounds or bruises, the first object must be to ascertain if they were inflicted during the life of the person, and for this purpose, if the wound be deep we must look for traces of blood;* if it has penetrated any of the large cavities, internal hæmorrhage will inform us; on the contrary, when no such appearances are presented, we must

* See the singular case of Sir E. Godfrey,† in 1678, who was first strangled, and bruised on the breast by four men, his own sword passed through him, and then thrown into a ditch. On the body being found, the end of the sword projected two hands breadth beyond the back; no blood could be found about the place, nor was there any followed the sword when withdrawn. "The breast was discoloured and bruised, and the neck was so flexible that the chin could be turned from one shoulder to the other. His face during life had been remarkably pale; but after death it became much suffused."

† Smith's Principles of Forensic Medicine, p. 225.

suppose the person to have been destroyed in some other way.

With regard to bruises, it has been said that similar appearances are sometimes presented in the skin after death, as are caused by bruises inflicted whilst the person lived. The former of these appearances has been called *suggillation*, and is an effusion of blood into the cellular substance from putrefaction; or it may sometimes be found during life, generally in the most depending parts of the body, when it may be caused by disease or pressure. The latter, or *ecchymosis*, can be produced in the living body only, and is also an effusion of blood into the cellular substance; it is soft, prominent, and of a dark colour. According to Zacchias and Fodéré, upon making an incision into a *suggillation*, the blood will be found fluid; and on cutting into an *ecchymosis* "a congestion of thick concrete blood will be found."*

The next object will be to ascertain whether any injury inflicted on the body, was the cause of death or not. There are some wounds which are necessarily fatal, as where large blood-vessels have been divided; where the injury has been extensive, or where an important organ is concerned. There are others, however, which are only fatal from peculiar circumstances. Owing to some idiosyncrasy, a wound may be fatal to one person, which by another would scarcely be noticed; or even to the same person under different circumstances. The consequences of a wound or bruise, inflicted on a person in ill health, would perhaps be fatal, whilst the same inflicted during health would create little or no inconvenience; hence the necessity of extreme caution in our decisions.

The law formerly held amenable for the consequences, a year and a day, any person who had inflicted violence upon another. This law was founded on correct principles. That a person may die immediately on receiving a blow from other causes, whilst a person may live for years, and still die from the injury he may have received at a very remote period, there can be no doubt. The law, however, now regards the intent, "and when there has been a design to kill, or do some grievous bodily harm, the crime is made out though the design may have failed." An instance is related by Dr. Smith, where, by the testimony of the medical prac-

* Smith's Forensic Medicine, p. 242. This is not universal; if an ecchymosis is recent, the blood is not coagulated, and in some instances it remains fluid for a long time.

titioner, the complexion of the case was considerably changed. A boy was struck on the head with a stick and his skull fractured by a man, on whose grounds he was committing depredations; on trial "it was not only proved that the boy was guilty of the provocation, and the man intended no more than chastisement; but that the stick was not of a size from which such mischief could have been anticipated; and that the injury resulted from the circumstance, that the skull was thinner than ordinary.

The third object must be to ascertain, if possible, whether the person came to his death by his own hands, or by the hands of others. For this purpose, we must notice the situation of the deceased; what sort of weapon was made use of, and whether it be found near him; the part of the body where the wound was inflicted. We must also inquire into the circumstances of his case, the state of his mind for some time previous; his general conduct, &c.; by these means we may sometimes be enabled to decide, and perhaps, thus rescue an innocent person from suspicion. On the other hand, great deceit is sometimes practised; for instance, "a man was found shot, and his own pistol discovered lying near him, from which circumstance, (and no person having been seen to enter or leave the house of the deceased) it was concluded he had destroyed himself; but on examining the ball by which he had been killed, it was found to be too large ever to have entered that pistol; in consequence of which discovery, suspicion fell upon the murderer."*

In quarrelling, a kick over the region of the stomach is a very frequent occurrence, and not unfrequently causes immediate death; this is probably owing to the shock received by the par vagum and the great sympathetic nerves being suddenly conveyed to the organs of respiration; which are thereby prevented from performing their natural functions. From external violence, the large vessels of the abdomen, the intestines, liver, &c. may be ruptured, and death be the consequence.—A case is mentioned by Dr. Male, where, from muscular action alone, in attempting to avoid falling from a horse, the liver was ruptured; and a case is recorded by Dr. Gordon Smith, where the right kidney was torn in two transversely, by a kick from a horse. The person survived but twenty minutes. It will be important to recollect that where death is supposed to have been caused

* Male's Juridical Medicine, p. 120.

by external violence, that cases are on record where without any such means, the person may have died suddenly from some internal disease, which can only be discovered by dissection. The following is a case of this kind which is taken from Smith's Forensic Medicine. "In the course of an altercation between a man and his wife, the woman died, and a clamour was raised that the husband had murdered her. An inquest being held, a verdict was returned against him, and he stood his trial at the following assizes. He was there acquitted; for evidence was given that he had not touched his wife during the quarrel, at least such is now the belief in the neighbourhood. The deceased was a person of an extremely violent temper; and on opening her body, it was found that she had been labouring under suppuration of the liver, and that an abscess had burst into the cavity of the abdomen, through the agitation into which she had been thrown.

I do not conceive it necessary to enter into any account of wounds, their treatment, &c. This cannot be expected in a short essay on forensic medicine, but must be referred to the province of the surgeon. It should be particularly remembered that where a wound has been of long standing and the patient has finally sunk under it, the surgeon will perhaps be liable to be very minutely questioned respecting the mode of treatment, &c. pursued in the case, and if it be found that the patient died from improper treatment or neglect on his part, it will redound much to his discredit in a court of justice, at the same time the prisoner must be acquitted. Care and attention, therefore, with a particular regard to the plan of treatment, cannot be too rigidly enforced in cases of this nature, upon which perhaps the reputation of a surgeon may depend.

Suffocation.

Under this head, we think, may with propriety be classed all the various means by which death is caused from an interruption of respiration. It is well known that an interruption of this process for a short time only will cause death. Whether it be produced by mechanical means, by exposure to noxious gases, or by submersion under water; which ever of these may be the cause, the effect is the same, the circulation of the blood is impeded; it becomes accumulated in the right side of the heart, the cavities of which, on dissec-

tion, will be found filled with dark venous blood; the vessels of the lungs become turgid, of a peculiarly dark blue colour: they may perhaps be ruptured, when effusions will take place, from their proximity to the heart; those of the brain also become filled, and pressure is thus made on that important organ, hence also, the appearance of great discoloration and lividity about the head, breast, and superior extremities of persons who have died from these causes. The most frequent means by which suffocation is effected, are by hanging and drowning; but there are others which are not of so frequent occurrence, as strangling, smothering, and noxious inhalations, each of which will be separately considered in this section.

Hanging.

When a body is found suspended by the neck, by means of a rope or any other ligature, it is probable that a physican will be immediately called in, and if the person be dead, it will be his duty, first to examine if he came by his death from hanging or other means. Together with the appearances of suffocation before mentioned, the eyes are staring, and their vessels turgid with blood; the tongue is sometimes protruded out of the mouth and wounded by the teeth; this, however, can only happen when the rope has pressed under the cricoid cartilage, for where it has pressed above the thyroid, it will on the contrary be pushed back; there is sometimes a discharge of bloody mucus from the mouth, nostrils, or ears; the hands are clenched; the shoulders elevated; in some instances, urine, fæces, or semen are expelled, and when the body has fallen from a height, the transverse ligament of the *atlas*, which confines the *dentatus* in its place, is ruptured and luxation of these bones is the consequence. Where many, or the most prominent of these appearances are found, our natural conclusion would be, that the person was alive when hanged.

It will next be necessary to ascertain whether the person hung, has committed suicide or was strangled. For this purpose, the place where the body was found must be noticed, also if there be any appearance around the spot indicating that there had been resistance or scuffling; inquire into the previous mind of the person, his conduct, his character, &c.; observe if robbery has been committed, the

dress and general appearance of the deceased. If the person has been found hanging in a room, with evident marks of external violence about the body, it is not to be considered as certain that he was murdered, he may have swung off with such violence as to break the rope or ligature, consequently, on falling he may have thus injured himself by striking against some of the articles of furniture, and afterwards suspended himself. A case is related by De Haen, where a suicide inflicted several wounds upon his face whilst he was suspended;* and others have been known where the person had wounded himself under similar circumstances.†

The situation of the cord about the neck is also to be taken notice of, and if two distinct marks are found, the lower one most discoloured, we may conclude that the person was first strangled and afterwards suspended. In such a case, if the person was alive and strangled by others, as much force must have been used, consequently, we might expect the cervical vertebræ to be dislocated, and if on examination such injury be found, our opinion would be considerably strengthened. On dissection the same appearances will be presented to us as mentioned when speaking of suffocation.

Hanging has very seldom been resorted to as an act of homicide, nevertheless, some instances of this kind are related; it is evident that much force and some preparation will be required to effect it. It is, however, generally, an act of suicide. There have been instances where children have been hung by their play-fellows for amusement, not being aware of the consequence; such cases have occurred in this country.

Drowning.

When called to a body in a drowning state, the physician will first resort to an employment of the means recommended for its restoration. Should he fail, or should it be evident from the appearance of putrefaction, &c. that such means are needless, two questions will immediately suggest themselves which will require solution.

First. Did the person come to his death accidentally, or

* Male's Juridical Medicine, 2d ed. p. 181.
† Smith's Forensic Medicine, p. 219.

was it his own act, or the act of others? It must be evident that it will in general be a matter of no inconsiderable difficulty to determine on these points. In many instances it will be quite impossible to clear up our doubts; in others, only by the evidence of persons who witnessed it. Where, however, it has been committed on or near the banks of a river, the appearances which may be presented to us about the spot, will sometimes entitle us to the conclusion that the person came to his death by the violent means of others, as when it would seem to indicate that great resistance had been made; marks of footsteps; substances, &c. grasped in the hands of the deceased when the body is found. This is well exemplified in the case of Mr. Taylor, who was murdered at Hornsey, in December 1818; marks of footsteps, deep in the ground, were discovered near the New River, and on taking out the body, the hands were found clenched, and contained grass, which he had grasped from the side of the water.*

We shall in some instances, be aided in no small degree, by taking into consideration the state of the person's mind, his previous conduct, circumstances, &c.

Secondly. Was the person alive, or first killed and then thrown into the water?

To determine this point, we shall in general be considerably assisted by the external appearance of the body. Should there be any wounds or bruises, we must take into consideration their nature and extent. the particular parts probably injured by them, and whether it is likely they were the cause of the person's death. We should, at the same time, duly consider whether these wounds or bruises were the effects of criminal interference or of accident, for it will be recollected that a person in falling, or even under water, may possibly strike against some hard substance, and thus cause appearances, in all respects similar to those inflicted with criminal intentions.

In endeavouring to ascertain the length of time that a body has been in the water, the usual criterion for determining this point, in connexion with the circumstances of the case, is the degree of putrefaction. Since the experiments of Dr. Gibbs† of Bath, however, we are enabled to determine the point with much greater precision. He has demonstrated that by continuing in water for from four to six weeks, the

* Smith's Principles, p. 215.

† Philosophical Transactions, part II. for 1794 and 1795

animal fibre will be converted into *adipocere*, a fatty substance known from its resemblance to spermaceti. The body of a drowned person is always pale, except about the face, which may be suffused; the expression of countenance is wild, and there is a frothy mucus in the mouth and nostrils. On dissection the usual appearances of suffocation are presented; sometimes water is found in the bronchiæ, which was supposed by Larrey, and De Haen to be the cause of death. As it is evident that water may be introduced into the stomach during drowning, or may have been taken in large quantities just before the person was thrown into the water; in either case, its presence is not of the least importance.

Respecting the buoyancy of bodies, considerable disparity of opinion prevails. It has been asserted by some, that bodies thrown overboard at sea without weights* attached to them, continue to float; by others that they sink. There can, however, be no doubt that a body on being thrown into water will sink, and continue so until the putrefactive process shall have generated sufficient gas to render it specifically lighter than water; after which, it will appear at the surface.

Strangulation.

This is a means much more commonly employed for criminal purposes than hanging. The external appearance of a person who has been strangulated, differs in some degree from one that has been hanged. In the former, the mark of the ligature "will generally form a complete horizontal circle round the neck." It may be situated in the middle or lower part of the neck, and if so, our opinion can easily be made up.

The same queries are applicable here, as in the case of drowning. It can seldom be considered an accidental occurrence, nor can it easily be committed by a person on himself, except through accident, as when a person is intoxicated, by falling, he may be so situated with his hand or some hard substances on his throat as to cause sufficient pressure, completely to prevent respiration.

There are various ways by which it can be accomplished;

* These are merely put on for the purpose of preventing the body from rising, and not for sinking them, as has been asserted.

it may be done by the hands of individuals, as in the case of Sir John D. Goodere, who was strangled in this manner, and upon whose neck, when examined by the surgeon, were found the marks of nails and fingers. Dr. Clench, who was murdered in 1692, was strangled in a hackney coach by two men, "while driving about the streets of the city." This was effected without the driver knowing any thing of it, and who found him dead, with a handkerchief round his neck and a piece of coal in it, which was applied immediately over the trachea so as to prevent respiration. Should there be wounds, or bruises, we must take them into consideration; and if any, observe whether they were inflicted before death, or afterwards, in order to prevent suspicion, as in the case of Sir E. Godfrey, mentioned at page 25.

The usual appearances of suffocation will be manifest in these cases on dissection, although perhaps not to so great an extent, for inasmuch as more time will pobably be required for its performance, and as great resistance will no doubt be made by the individual, so will respiration and circulation continue in some degree for a greater length of time, when it gradually ceases; whereas, when stopped at once, as in hanging and drowning, the vessels of the brain and lungs, and the right side of the heart will be found engorged with blood, which may perhaps, not be so much the case in strangulation, although at the same time, these appearances will generally be so self-evident as to leave little room for doubt.

Smothering.

Of this but little need be said. It is accomplished by so closing the mouth and nostrils as effectually to prevent the passage of air to the lungs. Children are generally the subjects of this mode of murder; it may be attempted on adults, but we think it will be very rarely, as so much force will necessarily be required for its accomplishment. Children are very liable to be destroyed in this way from accident, as by overlaying them with bed-clothes, pillows, &c. thus preventing the access of air to the lungs. In these cases the same appearances will be found on opening the body, as enumerated under the head of suffocation. In determining whether it was destroyed with a criminal intent or not, we shall be entirely governed by the circumstances of the case.

Noxious Inhalations.

We place these under this head, for it is evident that the circulation of the blood is impeded in the lungs, and consequently suffocation ensues. The only gaseous substance by means of which the lives of individuals have been destroyed through criminal interference, would appear to be the carbonic acid gas. "To kill a person by any other species of gas, would require a process of philosophical preparation and administration totally incompatible with our ideas of a criminal act."*

When a number of persons are confined together in a small room without ventilation, this gas is expelled from their lungs, and thus becomes accumulated to a dangerous extent. Instances of this kind are mentioned by Dr. Smith. At the surrender of Calcutta in 1756, one hundred and forty-six English prisoners were put into the "*black hole*," and remained there from eight o'clock in the evening until the following morning, when it was found that only twenty out of that number remained alive. A similar case occurred in London in 1742. Twenty persons were crammed into the hole in St. Martin's round-house, and during the night several of them died. It was decided by the surgeons who were consulted on the occasion, that "when the doors and windows were shut, the place could not support twenty persons for three hours without danger of their lives." What was the result of the trial, which took place at the Old Bailey, could not be ascertained.

In making up our opinion in these cases, the circumstances connected with them will generally enable us to determine. Death has not unfrequently been caused from accidentally inhaling this gas. We do not conceive this to be a proper place to enter into an examination of the nature, properties, &c. of carbonic acid gas. A knowledge of this will, however be necessary in a court of justice, and it is to be expected that every professional man will be prepared accordingly.

There are other species of death from suffocation, as doubling back and swallowing the tongue; large tumours about the throat; external pressure on the thorax, as when a person stamps upon the breast of another who is down;

* Smith's Forensic Medicine, p. 205.

blows on the thorax, which paralyze the muscles of respiration, and thus produce this effect. In examining dead bodies under any of the above circumstances, particular attention must be paid to the appearances about the organs of respiration; whether there be disease, and if so, whether it could have had any influence in causing the death of the person. An interesting case of suffocation caused by a tumour pressing on the trachea is recorded in the Quarterly Journal of Foreign Medicine and Surgery for October 1822, p. 605, by Alexander Pettigrew, Esq.

Poisons.

No longer is it necessary for the historian of the present day to record the various means and devices, which were resorted to for the destruction of human life, with which the pages of scarce two centuries ago abound. To enter into an account of "the art," of poisoning, as practised in France, and Italy, about that period would perhaps in this place be useless and unprofitable.* That age of barbarity, superstition, and cruelty has passed away, and reason aided by religion and just laws, has enabled mankind to appreciate more highly the beneficence of a wise Creator. Crimes of this nature are hence of comparatively seldom occurrence; nevertheless, as they sometimes occur, and as the opinion of the physician will greatly influence the decision of a jury, an intimate knowledge of the various poisons, the symptoms they produce when taken into the stomach, their treatment, tests, &c. will be indispensable.

Poisons may be taken accidentally; or intentionally on the part of an individual for the destruction of his own life; or they may be given by others with a criminal intent. Called to a person yet alive, who is suspected to have taken poison into his stomach, our first object must be to endeavour to remove or mitigate his suffering, and if possible, to preserve his life. We should be particular in noting every symptom, and at the same time we must endeavour to procure the vessel from which he last swallowed, and if their be any thing remaining in it carefully to preserve it, as also any thing

* For information on the subject, see Hargrave's State Trials. Beckman's History of Inventions. Causes celebres par Gayot de Pittaval, and Zacchias' Questiones Medico-Legales.

which may have been expelled from the stomach. Having procured this, we may be enabled to apply the proper remediate articles, from the result obtained, on submitting it to such tests as may be at hand, and a "corrobortive proof as to the particular deleterious article administered is to be obtained from the successful application of an established antidote."

On the other hand, called to examine the body of a person supposed to have been poisoned, we must, as above mentioned, endeavour to procure the vessel from which he is supposed to have last swallowed, as also any matters which may have been ejected from the stomach. Nothing I believe will be gained from the external appearances. Authors have noticed a peculiar lividity of the surface, disturbed countenance, and a frothy mucus issuing from the mouth. This last appearance, however, is commonly found in drowned persons, as also those who have died suddenly from any other cause. It will be necessary in order for a perfect examination, that the whole extent of the alimentary canal be examined with care, and its contents placed in proper vessels in order that it may be submitted to our chemical tests. When treating of the particular poisons, an account of the mode of proceeding, symptoms, appearances on dissection, tests, &c. will be given.

There are also several inquiries which should be made, particularly if the person is still alive, satisfactory answers to which would considerably influence us in forming an opinion; as, Was the person accustomed to such attacks before, on taking any particular substances which seemed to disagree with him, owing perhaps to some peculiarity of constitution; and if any, what were they? What was the state of his mind, as also his health previously? Was it likely that there was adulteration in any of the articles of cookery employed? Has the person been taking any medicines; and if so, what were they? These, with others of similar import, will readily suggest themselves.

In entering upon the consideration of the particular poisons, our observations must necessarily be much restricted. We shall therefore, only consider those which come most frequently under our observation, and which consequently, are most important. Respecting the classification, it is needless to observe, that as our remarks will be very general, we shall not take advantage of the excellent arrangement of Foderé as adopted by Orfila, and followed by several

other writers on the subject. We shall commence therefore the consideration of 1st, Animal Poisons; 2d, Vegetable Poisons; 3d, Mineral Poisons.

Animal Poisons.

Numerous as is this class of poisons, it will perhaps but very seldom come within the sphere of forensic inquiries. Instances, however, are not wanting where even they have been employed to destroy life. In every instance, however, the circumstances of the case will be so self-evident, that we shall seldom, if ever, encounter any difficulty in deciding.

In this class are comprehended poisons which are externally applied, and carried into the circulation, thus producing injurious effects. They may also produce the same effect from being taken into the stomach. In this country, particularly to the south, persons are not unfrequently killed by the bites of serpents, as the rattlesnake, it is far more dangerous when taken into the circulation in this way, than when the secretion of the serpent is swallowed,* for this has been taken into the stomach with impunity. But as this is always accidental, it need not be considered here. The stings of venomous insects also, sometimes occasion death; in like manner the bite of a rabid animal will cause death; the absorption of its saliva into the circulation is so rapid, that unless the bitten part is completely cut out immediately, hydrophobia will soon shew itself. Neither of these, however, is likely ever to come under our consideration in medico-legal inquiries. Besides poisonous fish, animal matters in a certain state of putrefaction are said by Foderé to be poisonous.

Cantharides.

The only animal poison upon which it seems proper to dwell particularly, is the Spanish or blistering fly; known by the names cantharis, lytta, and meloe vesicatoria. Taken in excessive doses, it produces most distressing symptoms, and therefore consequently advantage has been taken of it

* Smith's Forensic Medicine, p. 188. See experiments by M. Configliacchi in the London Medical Repository for December, 1820.

for criminal purposes, as in the case of Sir Thomas Overbury,* who was destroyed by it. Every one is familiar with the effects produced by its application to the skin. From its supposed peculiarity of acting on particular organs, it has been given with the most diabolical designs, and in many instances death has ensued.

Symptoms.

The symptoms produced by cantharides, when taken into the stomach in a large dose, are truly distressing; burning heat in the throat and stomach, foul breath, inflammation of the œsophagus, stomach and intestines; excruciating pain in the stomach; hot skin; full, frequent, hard pulse; violent retching and vomiting, with bloody stools; pain and heat in the bladder, with retention, or the urine comes off by drops, bloody, attended with the most severe pain, and the most painful and obstinate priapism. Finally, convulsions, delirium, and syncope come on, and death closes the scene.

Treatment.

Vomiting should be excited by mild diluent drinks, as sugar and water, barley water, linseed tea, &c. or sweet oil may be taken. For the inflammatory symptoms, the usual depletory measures must be had recourse to, and emollient clysters should be freely administered. "Camphor dissolved in oil may be rubbed over the belly and on the thighs."† Should it have been taken in the form of powder, it may be detected by its peculiar lustre in the matters discharged.‡

Vegetable Poisons.

From the difference of the effects produced on the system by different vegetable poisons, authors have divided them into two classes: 1st, the acrid; and 2d, the narcotic.

* Male's Juridical Medicine, p. 35.
† Stowe's Toxicological Chart.
‡ Smith's Forensic Medicine, p. 186; and Foderé Medicine Legale.

Acrid Poisons.

Among these are included a great number, the principal of which only need be mentioned.

1st. Colchicum Autumnale, or Meadow Saffron.
Veratrum Album, or White Hellebore.
Stalagmitis Cambogoides, Gamboge.
Cucumis Colocynthis. Bitter Apple.
Euphorbia Officinalis. Euphorbium.
Helleborus Niger. Black Hellebore.
Convolvulus Scammonia. Scammony.
Aconitum Napellus. Monks Hood.
Rhus Toxicodendron. Poison Oak.
Momordica Elaterium. Elaterium.
Juniperus Sabinæ. Savine, &c. &c.

Symptoms.

The symptoms produced by this class of vegetable poisons, when taken into the stomach, are an acrid bitter taste, nausea, violent vomiting, dryness of the mouth and fauces, with excessive thirst; the efforts at vomiting do not cease even when the stomach is emptied of its contents. At first, the pulse is strong and frequent, violent purging comes on, and the fæces sometimes pass off involuntarily; there is excruciating pain at the pit of the stomach, giddiness and delirium; the pulse now becomes slow, weak and irregular; the respiration is laborious, quick and painful; the pupils are dilated; fainting, with cold sweats ensue; and finally, apoplexy comes on, which speedily terminates the sufferings of the patient.

Treatment.

With respect to the treatment, our first object will be to endeavour to evacuate the contents of the stomach; for this purpose, we must resort to the employment of emetics. Sulphate of zinc would seem the most proper, but ipecacuanha, and tartarized antimony, have been highly recommended. Their operation should be aided by a very free exhibition of large quantities of warm beverages, as barley water, mucilaginous drinks, &c.; at the same time that the fauces are to be tickled with a feather. "A tobacco cataplasm should be laid over the epigastrium."* The tepid bath, with emollient

* Chapman's MS. Lectures.

injections, must also be employed. Should these means not succeed, we must endeavour to pump out the contents of the stomach. When we have completely evacuated the stomach, it may perhaps be necessary also to clear the alimentary canal of its contents; with this view, we should administer a brisk cathartic. In order to relieve the severe pain in the abdomen, it will be proper to employ fomentations, and local abstraction of blood by cups or leeches.

It not unfrequently happens when the stomach has been completely evacuated, that the effects of the poison do not disappear. In such cases, we must order the person to stir about. Strong coffee, or diluted vinegar, should be given freely. "Camphor mixture with æther may be taken frequently, and if insensibility be considerable, warmth, frictions, and blisters may be employed." Should inflammation supervene, we must recur to the antiphlogistic measures.

In the Annals of Philosophy for May, 1820, p. 380, there is a paper giving an account of several experiments performed by Mr. M. Drapiez, by which he ascertained that "the fruit of the Fewilla Cordifolia is a powerful antidote against vegetable poisons." These experiments were performed on dogs. He poisoned several with hemlock, rhus toxicodendron, and nux vomica. "All those that were left to the effects of the poison died, but those to whom the fruit of the fewilla cordifolia was administered, recovered completely after a short illness." A poultice of the fruit prevented the ill effects of a wound inflicted by arrows dipped in the juice of vegetable poisons.

Dissection.

It is said that the bodies of persons who have been killed by any of the articles of this class of poisons, swell greatly,* soon become gangrenous, and covered with livid spots. On dissection the veins are found congested, whilst the arteries are empty.† Gangrenous erosions and perforations‡ are sometimes found in the stomach. As a general rule, how-

* Male's Juridical Medicine, p. 46; and Dease's Medical Jurisprudence, p. 98.

† Male's Juridical Medicine, p. 46; and Duncan's Edinburg Dispensatory.

‡ Orfila Toxicology, p. 61. A very interesting and valuable paper will be found in the New England Medical Journal for April 1817, by. Dr. T. Romeyne Beck, entitled Observations on the Proofs of Murder by Poison, p. 122.

ever, it is to be remembered that nothing can be gained from appearances, for "no characteristic local effect can be perceived on dissection." But it will at the same time be borne in mind, that on examining the contents of the stomach and alimentary canal, we shall sometimes succeed in finding portions of the substance which may have been taken into them, and which may have remained undissolved, as the leaves, root, or the form of a pill; and it behoves every medical man to be well acquainted with the external appearances, as well as the smell, &c. of vegetables which occupy so conspicuous a rank as articles of the materia medica, for on this sort of knowledge alone will generally depend the accuracy of his evidence in these cases, in a court of justice.

Narcotic Poisons.

Those which are included under the class of narcotic poisons, are also very numerous, consequently, it will be impossible to enter upon them all individually in this place.—Among them the following are the principal.

Papaver Somniferum. Opium. This is perhaps more frequently employed for the destruction of human life than all the other articles of this class together. It is generally employed for this purpose in the form of tincture. Its action on different constitutions, from idiosyncrasy, or habitual use, will always be borne in mind. For detecting it, we must be guided by the symptoms, &c. to be mentioned when we come to treat of this class of articles. Interesting cases of poisoning by it are recorded.*

Laurus Cerasus. Cherry Laurel. The deleterious properties of this plant depend upon the presence of *Prussic Acid*, of which the distilled water contains a considerable quantity. In a concentrated state the prussic acid is transparent, colourless, and of an acrid taste; its smell is pleasant, resembling peach blossoms or bitter almonds. When poured on a plain surface, it spontaneously crystallizes; this, however, is not the form in which it is employed, except with great dilution. We shall consider it here, only as a component part of laurel water. Taken internally, it is said to produce violent convulsions, and "a mode of death similar to

* London Medical Repository, for November, 1820, and in the Edinburg Medical and Surgical Journal, for April, 1822, p. 226, there is a case related by a Mr. Richardson, which was cured by venesection.

that of epilepsy." A Captain Donellan was tried and executed at Warwick, in 1781, on suspicion of having poisoned a relative by laurel water.

Conium Maculatum, and *Cicuta Virosa*. Hemlock. This plant is much employed as a valuable article of the materia medica. It has been taken into the stomach through mistake, as in the case of the soldier mentioned by Orfila, who ate soup which contained this plant. There is also a case of accidental poisoning by cicuta, recorded by Dr. Hazeltine, in the New England Medical Journal for July, 1818. I know of no instance wherein it has been given criminally.

Datura Stramonium.* Thorn Apple, or James-town weed. Instances wherein persons have been poisoned by this plant, are by no means unfrequent. Introduced into the stomach in a large dose, it produces thirst, retching, tremors, delirium, and mania, which is said to be of a very singular character, "being attended with the most antic gestures, screaming, laughing, crying, and distorting the face continually." Complete insensibility supervenes; the extremities are cold, and respiration is hurried; "a deep coma comes on before death."

The following articles of this class need only be mentioned here, after which we shall proceed to enumerate in a very general way their symptoms, treatment, &c.

Laurus Camphora. Camphor.
Atropa Belladonna. Deadly Nightshade.
Nicotiana Tabacum. Tobacco.
Digitalis Purpurea. Fox Glove.
Hyosciamus Niger. Henbane.
Solanum Dulcamara. Woody Nightshade.
Strychnos Nux Vomica. Crow Fig.

Of poisoning by this latter article, several cases have lately been recorded in the medical journals of Europe. In a case of attempted suicide, recorded by Dr. Tacheron of Paris,† there was a complete state of *tetanus*, with violent convulsive movements. Another case is also recorded in the same number, by J. Ollier, Esq.

These, together with the whole family of Fungi, or mushrooms, upon which it is not necessary to dwell particularly,

* Cases of poisoning by this article will be found in the Edinburg Medical and Surgical Journal, for January, 1819; and in the same for January, 1820.

† London Medical Repository, No. 114, for June, 1823.

have been eaten through mistake, and similar unpleasant consequences have ensued.

Symptoms.

The following are the general effects of this class of narcotic poisons, when taken into the stomach; introduced into the circulation by a wound; or administered in form of a clyster. By these latter means, it is said by Orfila* to be much more decided in its effects. Nausea, a great desire to vomit, excessive thirst, with dryness of the mouth and fauces, and a sense of constriction in the pharynx; giddiness, or a species of intoxication, with a dull, heavy pain in the head; occasionally, there is pain, and a sense of weight at the pit of the stomach; great anxiety, and violent agitation of the muscles of the face; rigidity of the limbs; the skin is sometimes hot, when a perspiration comes on and leaves it cold. As the effects of the drug continue, convulsions, dilatation of the pupils, stupor and delirium comes on; the breathing becomes anxious and laboured; the pulse which was strong now becomes weak and scarcely perceptible; finally, a deep coma succeeds, which shortly ends in death.

Treatment.

In as much as the same objects are to be attained, the same course of treatment is to be pursued in this, as in the former class. Should the stupor or drowsiness (peculiar to this class) remain the same after these means have been employed, topical bleeding by cups, or from the jugular vein, should be tried, aided by blisters to the head and extremities, together with warm stimulating frictions. What we before said of the *fewilla cordifolia*, is applicable in this place; it will be recollected, that it must be in "as recent a state as possible."

Dissection.

The appearances on dissection will be found to be similar to those presented in the former class. We shall have to rel-

* System of Toxicology, p. 250.

chiefly upon our knowledge of the various articles of the materia medica, in case any part of the plant should be discovered in the stomach or alimentary canal, to enable us to form a correct opinion, and not upon any particular appearances left on the body after death.

Mineral Poisons.

It will only be possible for us to enter into the consideration of very few of the articles of this class of poisons. Those which have been most frequently employed for criminal purposes, and consequently those which are the most important, will be particularly mentioned. We shall commence with the consideration of mercury and its preparations.

Mercury.

The most active preparations of this metal are the *nitric oxyd* or red precipitate; the *sulphuret* or vermilion, and the *oxy-muriate* or corrosive sublimate. It is, however, to the latter of these that our observations will principally be directed. Taken in a small quantity, as from two to four grains, its deleterious effects on the system are well known. It is used in practice as a valuable remedy for disease, and by long continued use the system may be made to bear very large quantities of it.* It is a corrosive or escharotic poison, acting powerfully on the delicate texture of the stomach. It would seem from actual experiment that this article is not equally poisonous to all animals; for instance, the horse can bear a very large quantity with impunity, as also several other animals.†

Symptoms.

When taken in the stomach it almost immediately produces anxiety, palpitation, nausea, violent vomiting of a

* A man in Constantinople, known by the name of Suleyman *Yeyen*, or *Suleyman*, the taker of corrosive sublimate, having early in life habituated himself to the use of opium, finding that its effects were no longer pleasant, commenced the use of corrosive sublimate as a substitute. For thirty years he continued its use, and when arrived at the age of nearly one hundred years, his system had become so habituated to it, that the quantity he could now bear "exceeded a drachm."

† See the Experiments of Judge Cooper and Dr. Nancrede, in Cooper's Medical Jurisprudence, p. 445.

frothy mucus tinged with blood, and frequent bloody stools; burning heat in the mouth, throat, and stomach, with intolerable thirst and difficult deglutition; excruciating pain at the scrobiculus cordis and umbilicus, swelling and painful tenderness of the abdomen, which is increased on pressure; swelling of the face, contracted or dilated pupils, and parched lips, with a styptic metallic taste, and sometimes profuse ptyalism. The pulse is at first small, tremulous and quick; respiration becomes anxious, hurried and laborious; the secretion of urine is diminished, and sometimes complete strangury is produced. These symptoms are succeeded by aphonia, cold sweats, spasmodic contractions of the muscles, paralysis, tremors, fainting, tetanus, mania, convulsions, insensibility and death.

Treatment.

Called to a person who is suspected to have taken corrosive sublimate, we must endeavour to promote vomiting by the administration of very large quantities of diluent drinks, as fresh milk, gum arabic water, barley water, gruel, &c. Since the experiments of M. Orfila, the antidotal powers of albumen have been fully established by repeated trials.* Consequently, we should at the same time give the whites of eggs in large quantities, beaten up with water. Should we fail by these means, and inflammatory symptoms require it, the antiphlogistic measures must be employed.

Dissection.

The brain, stomach, alimentary canal, and liver, will be found highly inflamed. The coats of the stomach and bowels are sometimes found to be covered with gangrenous spots, highly inflamed and abraded. The uterus in females is also generally in an inflamed state. In the dissection of a case reported by J. W. Valentine, Surgeon,† the texture of the stomach was found totally destroyed through all the coats for two and a half inches in diameter, and on washing off

* London Medical Repository for June, 1820, p. 480. Edinburgh Medical and Surgical Journal for October, 1818, p. 174. London Medical and Physical Journal for June, 1821, p. 498. Transactions of the College of Physicians in Ireland, vol. iii, 1820.

† Edinburg Medical and Surgical Journal for October, 1818, p. 168.

the destroyed parts, only the peritoneal covering was left. The appearance was compared to a piece of leather burnt with a red hot coal.

Tests.

Where none of the poison can be found, and as vomiting is generally excited by it, we must procure the matter thrown up; or if the person be dead, the matter remaining in the stomach and alimentary canal must be obtained, and it is to this that our tests must be applied.

From its watery solution, corrosive sublimate is precipitated *white* by ammonia, deep *orange-yellow* by lime water, *red-orange* by the carbonates of soda and potash, *dark-brown* by the nitrate of tin, and of a *blackish-grey* by pure potash. These precipitates, when rubbed on a bright plate of copper, leave a white or silvery coat on it.

Albumen, mixed with cold water, when added to its solution, produces a copious precipitate of a white flocculent appearance; ox-bile gives the solution a dark green colour, and pig's a dirty red. The solution, when dropped on clean copper and rubbed, will communicate a silvery lustre; dropped on litmus-paper, a red colour will be produced. Polished silver dipped in it is instantly tarnished, and receives a dull pewter colour.

I shall proceed to mention the plan laid down by Mr. Smith, for obtaining mercury in a metallic state from the matter vomited up. "The fluid part of the substance rejected, being filtered, we are to apply the tests to the product of this operation; and the solid parts being well macerated in distilled water, we are to treat in the same manner; and it is recommended by Orfila, where we do not obtain the precipitates in the way described; where they do not correspond in colour, or are altogether withheld, to mix the fluid with caustic potass (in solution,) and evaporate in a capsule to dryness; after which, detaching the residue, it should be heated to redness in a small glass retort with a balloon adapted to it. If metallic mercury be then obtained in the neck of the retort, the experiment will be satisfactory. This is a process which cannot be entered upon during the immediate emergency of the case, but we must observe the precautions necessary to insure its future success."

The application of galvanism has been recommended by

Mr. Sylvester for the detection of corrosive sublimate. It exhibits it in the metallic state.

Arsenic.

The preparation of this metal which has most commonly been employed for criminal purposes, is the white oxyde, or arsenious acid. There are, however, other preparations of it whose effects on the animal system are extremely deleterious, but of which it is unnecessary to treat particularly.

In its metallic state, arsenic I believe has never been employed for this purpose, nor is it of any use in the arts; nevertheless, it is necessary that we should be well acquainted with its external appearance, as we shall, in all cases of suspected poisoning by it, have to obtain it in the metallic state, without which our evidence will be considered incomplete. It is of a steel-blue colour, brittle, and when broken has considerable lustre, but which is lost on exposure to moist air, when it becomes encrusted with a grey powder. It burns with a blue flame on being heated in the air, and emits white fumes which have the smell of garlic.

Arsenious acid has been taken through mistake, but this is rare, for it generally happens that it is intentionally taken. The same symptoms and effects are said to be produced by its external application, and instances are related where it has destroyed life by being applied to ulcers, &c.

Symptoms.

Arsenic taken into the system produces hiccough, nausea, slight chills, an austere taste, sense of heat in the mouth and throat, constriction of the pharynx and œsophagus; as the effects continue, the symptoms become alarming, anxiety, palpitation, oppression in the breast, violent pains in the stomach and bowels, accompanied with violent vomiting and painful diarrhœa. The matters discharged are generally of a dark brown or black colour, mixed with blood; the secretion of urine is diminished and bloody; the pulse is generally frequent and irregular; there is a peculiarity of countenance indicative of extreme agony, and a livid circle is formed round the eyes. Unquenchable thirst comes on, the body is sometimes hot and sometimes cold; it becomes tumid and covered with livid spots; the hair comes out, and the

epidermis is detached. Cold sweats, succeeded by spasms of the extremities, paralysis, tremors, numbness of the hands and feet, great prostration of strength, syncope, delirium, convulsions and death.

It will be recollected, however, that these are not uniformly the symptoms produced by arsenic. In some instances, persons have only experienced slight nausea and fainting, succeeded by death; others only vomiting and purging, so as to render it somewhat difficult to be distinguished from cholera morbus. We shall, however, generally perceive several of the above symptoms, but we can never expect to find them all in the same case, although all have been observed.

Treatment.

It is recommended in these cases, to endeavour to promote vomiting by the exhibition of an emetic of sulphate of zinc or ipecacuanha, assisted by drinking large quantities of sweetened water, decoctions of linseed, mallows, or other emollient drinks. Lime water with sugar, or chalk and water, have been highly recommended to be drank freely where the arsenic has been taken in *solution*. Milk, according to Mr. Navier, has a peculiar efficacy in dissolving arsenic.

Numerous articles have been recommended as antidotes* to arsenic, as liver of sulphur, charcoal, vegetable decoctions, &c. According to Orifila, however, "they ought not to be used, because they are not only useless but often injurious." We are not to neglect the general treatment; for this purpose, clysters, bleeding local and general, warm fomentations, with frequent emollient clysters, &c. must be had recourse to. When the symptoms have subsided, the patient should be put upon a light nutritive diet, as chicken broth, gruel, &c. solid food must not be given.

Dissection.

The bodies of those who have been destroyed by arsenic, are sometimes swelled and covered with livid spots, as is

* I find by the London Med. Repository for December 1820, that the juice of the sugar cane is recommended by Dr. Chisholm, in a paper read before the Society of Geneva, as "the best antidote known for arsenic." It was tried upon various animals in the West Indies with complete success, and is said always to have succeeded. Its power in the Island of Nevis is generally known.

the case with those who have been destroyed by vegetable poisons. The appearances presented on dissection, vary in different cases. The stomach and intestines are generally found inflamed, abraded and corrugated; livid spots are sometimes found in the lungs, and the vessels of the brain are filled with blood. The inflammation is said to be greatest in the stomach and rectum, and not unfrequently ulceration or mortification of the rectum and pudenda will be perceived; the latter is said to be an effect peculiar to arsenic. A remarkable glaring mucus is said to be secreted by the mucous coat of the stomach, to which, if the poison has been taken in the solid form, small pieces will be found adhering."

Tests.

When arsenious acid is combined with an alkali, as subcarb. potass. sulphate of copper produces a precipitate of a striking colour, being that of *Scheele's green;* should there be no *arsenic* in the liquor, and a fixed alkali has been employed, the precipitate, instead of being a *grass-green*, will be of a delicate *sky-blue*. Ammoniaco-nitrate of silver produces a beautiful *yellow* precipitate, which becomes black on exposure; this is a very delicate test: By it, $\frac{1}{60}$ part of a grain may be "satisfactorily recognized in ℥ij of water." Added to a solution of arsenious acid, lime water produces a *white*; sulphate of ammoniacal copper a *green*, and sulphuretted hydrogen an *orange yellow* precipitate. Arsenious acid, when dissolved in albumen or gelatine, is precipitated by the tests, nearly the same as from the aqueous solution. Having thus procured these precipitates, it will now become necessary to produce the metal, and having accomplished this, our evidence will be conclusive.

To reduce arsenious acid to the metallic state, "mix a portion of the suspected powder with three times its weight of *black flux*, (consisting of finely powdered charcoal, one part, dry carbonate of potass, two parts,) put the mixture into a thin glass tube, hermetically closed at one end, about eight inches in length, and one-fourth of an inch in diameter; should any of the powder adhere to the sides of the tube it must be carefully brushed off with a feather, so that the inner surface of its upper part may be perfectly clean and dry; the closed end of the tube, by way of security, may be thinly coated with a mixture of pipe clay and sand, but

this operation is not absolutely necessary; the open extremity is to be loosely plugged with a piece of paper; the coated end must be now heated on a chaffing-dish of red hot coals, when the arsenic, if present, will sublime, and be found lining, with a brilliant metallic crust, the upper part of the tube; a portion of this reduced metal, if it be arsenic, will, when laid on heated iron, exhale in dense fumes, which are characterized by a strong smell of garlic."* Dr. Paris has ascertained that the alliaceous or garlic-like smell is wholly confined to *metallic* arsenic in a state of vapour,† and that unless the arsenical vapour be de-oxidised by the presence of some body which has a powerful affinity for oxygen, it is perfectly inodorous; hence, when arsenious acid is thrown on charcoal or metallic bodies in a state of ignition, such a de-oxidation takes place, and the peculiar smell is evolved. This it will be of immense importance not to overlook, for by subjecting it on a piece of copper to the heat of a spirit lamp, the acid is dissipated before sufficient heat is obtained, and consequently no odour is perceptible.

The preparations of antimony, lead, copper, tin, zinc, &c. produce symptoms nearly resembling those of the class of corrosive poisons. I do not recollect to have heard of a case where either of them have been employed for criminal purposes, although several of them have been taken through mistake, and have produced fatal effects. Not conceiving it necessary to dwell particularly on any of them, I shall proceed to notice, in a cursory manner, the

Mineral Acids.

Taken internally, the sulphuric, muriatic, nitric, and oxalic acids produce nearly the same symptoms. A burning heat in the mouth, excruciating pain in the throat and stomach, hiccough, excessive thirst, vomiting of a yellow matter mixed with blood, diarrhœa, with tenesmus, bloody stools and strangury. The breathing becomes difficult, pulse irregular, surface cold, distorted countenance, convulsions and death.

Treatment.

Large quantities of dissolved soap and chalk should be drank, or, mix an ounce of calcined magnesia with a quart

* Paris Pharmacologia, p. 210.
† Journal of Science, for 1819, vol. 1. p. 342.

of water, of which give a tumbler full every few minutes. Endeavour to promote vomiting by tickling the fauces. If oxalic acid has been taken, chalk and water must be given, in preference. When the poison is evacuated, give diluent drinks, as gruel, milk, &c. together with injections of the same. Inflammatory symptoms are to be treated on general principles. Water alone should never be given, when sulphuric acid has been taken, as "intense heat is generated by the mixture."

Dissection.

The lining membrane of the mouth and œsophagus hangs loose; the teeth are loose; the stomach is eroded, and its texture is sometimes completely destroyed, as also the intestines, where the acid has come in contact. Nitric acid stains every part which it touches of a yellow colour.

Tests.

Sulphuric acid. If this has been taken, it is known by producing great heat when mixed with water; no fumes are emitted. By adding to it barytes, a sulphate, insoluble in nitric and muriatic acids and water, will be formed. Chalk or potash will produce an effervesence.

Muriatic acid. Nitrate of silver added to it produces a very white flaky precipitate of muriate of silver, which is soluble in ammonia, &c., and a light coloured one by the nitrate of mercury. It emits pungent fumes.

Nitric acid tinges the skin of a yellow hue. When copper is added to it, orange coloured fumes are emitted, and it is changed blue. A nitrate is formed by the addition of potash, which deflagrates when thrown on burning coals.

Oxalic acid. Lime and all its salts are precipitated by this acid, hence lime water is a good test, it produces a milky precipitate. Sulphuric acid decomposes it. It is volatilized by heat.

Of the phosphoric acid, the tartaric acids, &c. we shall say nothing. In a former chapter, under the head of laurel water, we alluded to the prussic acid.

The alkalies and their earths are also very virulent poisons, when taken into the system. *Nitre*, or saltpetre, has not unfrequently been taken through mistake, from its resemblance

to Glauber's salts. The symptoms and treatment, mentioned when treating of arsenic, are nearly applicable in this case, with the exception, that lime water is not proper here.

Tests.

When nitre is powdered, and sulphuric acid poured on it, a white vapour is emitted; thrown on burning coals, "it crackles and give a beautiful white flame." It is thus distinguished from sulphate of soda.

FINIS.